

CLAIMS

- 5 1. The use of a low dose of IL-6, or a mutein, isoform, fused protein, functional derivative, active fraction or circularly permuted derivative or a salt thereof, for the manufacture of a medicament for the treatment and/or prevention of liver injury.
2. The use according to claim 1, wherein the liver injury is cirrhosis.
3. The use according to claim 2, wherein the liver cirrhosis is compensated cirrhosis.
- 10 4. The use according to claim 2, wherein the liver cirrhosis is decompensated cirrhosis.
5. The use according to claim 2, wherein the treatment includes liver resection.
6. The use according anyone of claims 1 to 5, wherein the dose is in the range of 0.1 to 10 mcg/kg weight.
7. The use according anyone of claims 1 to 5, wherein the dose is about 0.1 mcg/kg.
- 15 8. The use according anyone of claims 1 to 5, wherein the dose is about 1 mcg/kg.
9. The use according anyone of claims 1 to 5, wherein the dose is about 10 mcg/kg.
10. The use according to anyone of claims 1 to 9, wherein the IL-6 is glycosylated at one or more sites.
11. The use according to claims to anyone of claims 1 to 9, wherein the IL-6 is non-
20 glycosylated.
12. The use according to anyone of claims 1 to 11, wherein the fused protein comprises an immunoglobulin (Ig) fusion.
13. The use according to anyone of claims 1 to 11, wherein the fused protein comprises IL-6 and gp80 or a fragment of gp80.
- 25 14. The use according to any of the preceding claims, wherein the functional derivative comprises at least one moiety attached to one or more functional groups which occur as one or more side chains on the amino acid residues.
15. The use according to claim 14, wherein the moiety is a polyethylene moiety.
16. The use according to claim 1 wherein, the medicament comprises a cell expressing
30 IL-6, or a mutein, isoform, fused protein, active fraction or circularly permuted derivative thereof.

17. The use according to claim 1, wherein the medicament comprises an expression vector comprising the coding sequence of an IL-6, or a mutein, isoform, fused protein, active fraction or circularly permuted derivative thereof.
18. The use according to claim 17, wherein the vector is a lentiviral vector.
- 5 19. A method for treating and/or preventing liver injury, comprising administering to a patient in need thereof a low dose of IL-6, or a mutein, isoform, fused protein, functional derivative, active fraction, circularly permuted derivative or a salt thereof, optionally together with a pharmaceutically acceptable carrier.
20. The method according to claim, wherein the liver injury is liver cirrhosis.
- 10 21. The method according to claim 20, wherein the cirrhosis is compensated cirrhosis.
22. The method according to claim 20, wherein the cirrhosis is decompensated cirrhosis.
23. The method according to claim 20, wherein the method of treatment includes liver resection.
24. The method according to anyone of claims 19 to 23 wherein the dose is in the range
15 of 0.1 to 10 mcg/kg weight.
25. The method according to anyone of claims 19 to 23, wherein the dose is about 0.1 mcg/kg.
26. The method according to anyone of claims 19 to 23, wherein the dose is about 1 mcg/kg.
- 20 27. The method according to anyone of claims 19 to 23, wherein the dose is about 10 mcg/kg.
28. The method according to anyone of claims 19 to 27, wherein the IL-6, or a mutein, isoform, fused protein, functional derivative, active fraction, circularly permuted derivative or a salt thereof is administered daily.
- 25 29. The method according to anyone of claims 19 to 27, wherein the IL-6, or a mutein, isoform, fused protein, functional derivative, active fraction, circularly permuted derivative or a salt thereof is administered three times per week.
30. The method according to anyone of claims 19 to 27, wherein the IL-6, or a mutein, isoform, fused protein, functional derivative, active fraction, circularly permuted
30 derivative or a salt thereof is administered once a week.

31. The method according to anyone of claims 19 to 27, wherein the IL-6 is glycosylated at one or more sites.
32. The method according to anyone of claims 19 to 27, wherein the IL-6 is not glycosylated.
- 5 33. The method according to anyone of claims 19 to 27, wherein the fused protein comprises an immunoglobulin (Ig) fusion.
34. The method according to anyone of claims 19 to 27, wherein the fused protein comprises IL-6 and gp80 or a fragment thereof.
- 10 35. The method according to anyone of claims 19 to 27, wherein the functional derivative comprises at least one moiety attached to one or more functional groups which occur as one or more side chains on the amino acid residues.
36. The method according to claim 35, wherein the moiety is a polyethylene moiety.
37. The method according to claim 19, wherein a cell expressing an IL-6 or a mutein, isoform, fused protein, active fraction or circularly permuted derivative thereof is administered.
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38. The method according to claim 19, wherein an expression vector comprising the coding sequence of an IL-6 or a mutein, isoform, fused protein, active fraction or circularly permuted derivative thereof is administered.
- 20 39. The method according to claim 38, wherein the vector is a lentiviral vector.
40. A method for treating and or preventing a liver cirrhosis including resection, comprising administering to a patient in need thereof an effective low dose of IL-6, a mutein, fused protein, active fraction or circularly permuted derivative thereof, or comprising administering to a patient in need thereof an expression vector comprising the coding sequence of IL-6, a mutein, fused protein, active fraction or circularly permuted derivative thereof or a cell producing the same.
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41. A method for treating or preventing a liver injury, comprising administering to a patient in need thereof an effective low dose of IL-6, a mutein, fused protein, active fraction or circularly permuted derivative thereof, or comprising administering to a patient in need thereof a low dose of IL6, or a mutein, fused protein, active fraction or circularly permuted derivative thereof or an expression vector comprising the
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coding sequence of IL-6 , a mutein, fused protein, active fraction or circularly permutated derivative thereof.

42. The method of treatment according to claim 41, wherein the liver injury is liver cirrhosis.
- 5 43. The method of treatment according to claims 41 or 42, wherein the patient in need suffers from end stage liver insufficiency .
44. The method of treatment according to claims 41 or 42, wherein the patient in need suffers from liver insufficiency after resective liver surgery.
45. The method of treatment according to claims 41 or 42, wherein the patient in need
10 suffers from acute liver insufficiency.
46. The method according to claim 41, wherein injury is caused by resection.
47. The method according to claim 46, wherein the patient in need is a transplantation donor.
48. The method according to claims 46 or 47, wherein the administration is carried out
15 before during and/or after resection treatment.
49. The method according to anyone of claims 41 to 48, wherein the low dose administered is in the range of 0.1 to 10 mcg/kg weight.
50. The method according to anyone of claims 41 to 49, wherein the IL-6, or a mutein, isoform, fused protein, functional derivative, active fraction, circularly permutated
20 derivative or a salt thereof is administered daily.
51. The method according to anyone of claims 41 to 49, wherein the IL-6, or a mutein, isoform, fused protein, functional derivative, active fraction, circularly permutated derivative or a salt thereof is administered three times per week.
52. The method according to anyone of claims 41 to 49, wherein the IL-6, or a mutein,
25 isoform, fused protein, functional derivative, active fraction, circularly permutated derivative or a salt thereof is administered once a week.
53. The method of treatment according to claim 41, wherein the cirrhosis is severe.
54. The method of treatment according to claim 41, wherein the cirrhosis is acute.
55. A method for treating a liver injury followed by engraftment, comprising
30 administering to a patient in need thereof an effective low dose of IL-6, a mutein, fused protein, active fraction or circularly permutated derivative thereof, or

comprising administering to a patient in need thereof an expression vector comprising the coding sequence of IL-6 , a mutein, fused protein, active fraction or circularly permuted derivative thereof.

56. The method of treatment according to claim 55, wherein the liver injury is liver
5 cirrhosis.
57. The method of treatment according to claim 56, wherein the cirrhosis is severe.
58. The method of treatment according to claim 56 wherein the cirrhosis is acute.